Summer 2019

CE 333-141: Reinforced Concrete Design

Tai Luu

CE 333 - Reinforced Concrete Design Section: 141	Summer 2019
Texts:	1)Wight, James and MacGregor, James, Reinforced Concrete Mechanics & Design, 7th Ed., Prentice Hall, 2012, ISBN:978-0-13-348596-7 2) (recommended) ACI 318-11, Building Code Requirements for Structural Concrete and Commentary, American Concrete Institute, 2011,http://www.concrete.org/bookstorenet/Productdetail.aspx?ItemID=31811
Instructor:	Mr. Tai Luu P.E., Room TBD, ttl4@njit.edu, Office Hours: by appointment only

Prerequisites: *CE 332 and CE 260. The student must have a working knowledge of structural analysis including determinate and indeterminate beams and frames. Primary objectives include the following: to acquaint the student with the properties of concrete and steel and with the behavior of reinforced concrete as a structural material; also to develop methods for the design of reinforced concrete structural members such as beams, slabs, footings, and columns. Both ultimate strength design and working stress method will be studied.*

Week	Topics	Contents	Homework Problems
1	Introduction, Material Properties, ACI Mix Design	Chap. 1 & 3	Assigned in class
2	ACI Structural Design Philosophy, Structural Concrete Systems and Continuity in R.C. Buildings	Chap. 1 &2 5-1, 5-2 10-2, 10-6	
3,4	Flexural Analysis (Strength Method) in beams	4-1 to 4-8	
5,6	Flexural Design (Strength Method) in Rectangular and T-Beams	5-1, 5-2 and 5-3	
7	Shear Design (Strength Method) in Beams	6-1, 6-2, 6-3 & 6-5	
8	Computer use in Structural Analysis and Design of RC Members	Exact time may change depending on progress on other topics and class needs	
9	Strength Method for One-Way Slab Design and Introduction to Two-Way Slab Design	5-1, 5-2 and 5-5	
10	Strength Method for Bond Development Length, Bar Splices and Cutoffs	Chap. 8	

11	Serviceability Requirement-Control of Cracking, Serviceability Requirement-Control of Deflection	9-1 to 9-5	
12	Strength Method for Reinforced Concrete Short Columns	11.1-11.6	
13	Strength Method for Footing Design	15-1 to 15-5	
14	Review and time for quizzes		
15	FINAL EXAM		

HOMEWORK: Read ACI 318-11. Homework design and computer problems will be assigned by the instructor.

GENERAL INFORMATION

Homework problems will be assigned by the instructor. Also, the students are encouraged to solve many additional problems in the text book. During the term, each student is required to complete the following requirements in addition to the requirements previously mentioned.

1. Use Robot (or program of your choice) to design a reinforced concrete structure (to be assigned). Each student upon completion of the project must show ability to model simple structures (including various types of loading and boundary conditions) with a structural analysis and design package.

The tests will be open book and (text book only) you will be allowed to bring in the ACI-318-11 Code and Commentary. The final grade will be arrived at on the following basis.

Mid Term	35 Points
Final Exam	40 Points
Homework	10 Points
Project	15 Points
TOTAL	100 Points

*The NJIT Honor Code will be upheld, and any violations will be brought to the immediate attention
of the Dean of Students.
*Students will be notified well in advance should there be any modifications or deviations from the syllabus throughout the course of the semester.
*No make up will be given. Under legitimate, documented and extenuating circumstances the grade for the final exam will be used for missed quiz.

CEE Mission, Program Educational Objectives and Student Outcomes

The mission of the Department of Civil and Environmental Engineering is:

- to educate a diverse student body to be employed in the engineering profession
- to encourage research and scholarship among our faculty and students
- to promote service to the engineering profession and society

Our program educational objectives are reflected in the achievements of our recent alumni:

1 – Engineering Practice: Alumni will successfully engage in the practice of civil engineering within industry, government, and private practice, working toward sustainable solutions in a wide array of technical specialties including construction, environmental, geotechnical, structural, transportation, and water resources.

2 – Professional Growth: Alumni will advance their skills through professional growth and development activities such as graduate study in engineering, research and development, professional registration and continuing education; some graduates will transition into other professional fields such as business and law through further education.

3 – Service: Alumni will perform service to society and the engineering profession through membership and participation in professional societies, government, educational institutions, civic organizations, charitable giving and other humanitarian endeavors.

Our Student Outcomes are what students are expected to know and be able to do by the time of their graduation:

1. an ability to identify, formulate and solve complex engineering problems by applying principles of engineering, science and mathematics
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety and welfare, as well as global, cultural, social, environmental and economic factors
3. an ability to communicate effectively with a range of audiences
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental and societal contexts
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

Revised: 2/13/18

Course Objectives Matrix – CE 333 Reinforced Concrete Design

Strategies, Actions and Assignments	ABET Student Outcomes (1-7)	Program Educational Objectives	Assessment Measures
Student Learning Outcome 1: Apply design methodologies, codes and specifications to the design of reinforced concrete members and elementary structures.			
Illustrate ultimate strength and allowable stress design philosophies.	1, 2	1, 2	Homework, projects, quizzes, and exams.
Formulate the ultimate strength design methodology.	1, 2	1	Homework, Projects, quizzes, a exams.
Discuss the ACI design codes.	1, 2, 4	1, 2, 3	Homework, Projects, quizzes, and exams.
Student Learning Outcome 2: Apply and enhance knowledge of strength of materials and structural analysis.			
Incorporate and apply basic knowledge of strength of materials.	1, 2	1	Homework, quizzes, and final exam.
Incorporate and apply basic knowledge of structural analysis.	1, 2	1	Homework, quizzes, and final exam.
Student Learning Outcome 3: Incorporate proper use of modern engineering tools for problem solving and communication.			
Introduce state of the art analysis and design software (such as Rivet/Robot, STAAD/Pro, SAP2000 etc.).	7	1, 2	Homework and projects that are solved using STAAD/Pro.

Discuss the pitfalls of computerized analysis and design and the need for sound engineering judgement.	7	1, 2	Homework and projects are solved both manually and by STAAD/Pro.
Place some assignments and course syllabus on the internet. Use e-mail for communications.	7	1	None.
Student Learning Outcome 4: Develop decision making skills and provide an environment for independent thinking while encouraging effective teamwork.			
Demonstrate non uniqueness of design solutions.	1, 2	1, 2	Design problems.
Require independent work on homework and projects, and all quizzes and exams.	1, 2	1, 2	Homework, projects, quizzes, And final exam.
Require teamwork for some assignments.	5	1, 2	Homework and Projects.